ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules to Provide for Unlicensed NII/SUPERNet Operations in the 5 GHz Frequency Range	)	**ET Docket No. 96-102**

COMMENTS OF LUCENT TECHNOLOGIES INC.

Lucent Technologies Inc. ("Lucent") submits these comments in response to the Commission's Notice of Proposed Rulemaking in this proceeding released May 6, 1996 ("NPRM").

Lucent is comprised of the former systems and equipment businesses of AT&T. Lucent designs, develops, manufactures and markets telecommunications systems, components and software for wired and wireless, narrowband and broadband, analog and digital telecommunications networks around the world. Bell Laboratories is the innovation arm of the company. Bell Laboratories conducts research and development focused on software and information sciences, digital signal processing, communications science and networking technologies, microelectronics and photonics. Bell Laboratories is widely regarded as one of the world's foremost industrial research and development organizations.[1]

[1] Bell Labs has received an average of one patent a day since its inception in 1925, is home to seven Nobel Prize winners, and has won seven United States National Medals of Science and five United States National Medals of Technology. Bell Labs' scientific

Lucent is an active member of the Wireless Information Networks Forum ("WINForum"), and has been a strong proponent of an allocation for broadband unlicensed devices. In anticipation of the Commission's proposed action in this docket, Lucent is currently conducting a number of research and development projects for products in the 5 GHz band.

Lucent strongly supports the Commission's proposal to allocate spectrum for NII/SUPERNet devices. As the record in this proceeding clearly shows, it is critical that a wireless infrastructure capable of supporting multimedia technologies be established. These NII/SUPERNet devices will advance the needs of educational institutions, medical facilities, businesses and other users. Rapid action by the Commission to allocate this spectrum will stimulate new markets and strengthen the ability of U.S. manufacturers to compete globally in the provision of the next generation of unlicensed devices. There should be no question that these devices will satisfy a public need.

Through its participation in WINForum, Lucent has worked closely with others in the industry to arrive at a consensus on the appropriate regulatory framework for NII/SUPERNet devices. Lucent strongly supports the positions taken by WINForum in its comments to the NPRM. The following comments amplify and complement certain of the positions taken by WINForum.[2]

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contributions include the transistor, the laser, the solar cell, the communications satellite, cellular telephony, and electronic switching.

[2] Lucent is also a member of the ATM Forum which has filed comments in support of an allocation for NII/SUPERNet devices.

Spectrum Allocation

Lucent applauds the Commission for recognizing the need to allocate a sufficient amount of spectrum to meet the needs of wireless broadband technologies. In this regard, Lucent agrees with WINForum that the 350 MHz proposed in the NPRM is the minimum amount necessary to support NII/SUPERNet technologies. Additional spectrum will likely be needed as these devices become widely deployed. Lucent's preliminary analysis indicates that NII/SUPERNet devices could co-exist easily with the government radiolocation systems operating in the 5.35 - 5.725 GHz bands. The Commission should not, however, delay the resolution of this proceeding to address that issue. Rather, the Commission should move forward and adopt its proposal to allocate 350 MHz now and initiate a separate inquiry into the use of NII/SUPERNet devices in the 5.35 - 5.725 GHz bands.

Channelization

Lucent disagrees with the Commission's proposal in the NPRM not to adopt a channelization plan. A channelization plan is critical to the success of the types of broadband wireless devices that the NPRM anticipates will develop. Lucent suggests a minimum channelization plan of 20 to 25 MHz. Allowing narrower bandwidth applications to share the spectrum will undercut both the efficiency and viability of broadband applications, a result that is contrary to the Commission's desire to encourage the development of broadband applications. Adopting a minimum bandwidth

requirement in this amount will help ensure the success of wireless broadband applications.

Modulation Efficiency

The NPRM requests comment on whether a minimum modulation efficiency requirement should be specified and suggests that a limit of 1 bps/Hz be required. Lucent agrees that some control of spectrum use efficiency is needed for the NII/SUPERNet band. However, Lucent believes that it is possible to get better spectrum use efficiency with a modulation efficiency requirement lower than the 1 bps/Hz suggested.

In particular, Lucent notes that modulation efficiency as defined in the NPRM does not directly correlate to overall spectrum efficiency. However, spectrum use efficiency is better represented in terms of average throughput per unit area. A robust system with low modulation efficiency (low bps/Hz) that is capable of operating in the presence of higher interference may have higher throughput per unit area (spectrum use efficiency) than a less robust system with high modulation efficiency.

In light of the possibility that better spectrum use efficiency can be achieved, Lucent proposes that the industry be asked to consider this question in the development of the sharing rules and to propose a method of assuring efficient use. In this regard, Lucent believes that the minimum modulation efficiency should be in the order of 0.5 bps/Hz. Lucent's proposal is based upon the division of the signaling speed by the half-

power or 3 dB bandwith as opposed to the emission bandwidth.[3] We note that the NPRM could be interpreted to mean the signaling speed divided by a 25 MHz emission bandwidth. Lucent believes the more appropriate means of calculating efficiency limits is to use the 3 dB bandwidth as opposed to the emission bandwidth. However, if the emission bandwidth is used, then the limit should be lower.

Interim Rules

The NPRM asks for comment on the need for interim spectrum sharing rules. While Lucent is eager to expedite the resolution of this proceeding, Lucent believes that any interim spectrum sharing rules in the lower band—particularly the interim sharing rules proposed by the Commission—will both hinder the introduction of future systems that are optimized more and also inhibit the process of developing an industry consensus for spectrum sharing rules

The specific interim sharing rules proposed by the Commission—the "Listen-Before-Talk" protocol—are particularly ill-suited for NII/SUPERNet devices. Any spectrum sharing rules which are adopted should efficiently support the emerging need for wireless communications of data, video, voice and graphics characteristic of multimedia needs. This requires four service classes of information flow (constant bit rate, variable bit rate, available bit rate and unknown bit rate) that WINForum proposed

[3] 47 CFR §21.122(a)(1) cited in the NPRM requires the signaling speed in bits per second to be greater than the bandwidth specified by the emission designator in Hertz. 47 CFR §94.94, also cited, requires the signaling speed to be less than the authorized bndwidth in Hertz. Each of these bandwith terms normally refer to the 0.5% occupied bandwidth as defined in 47 CFR §2.202(a). We use the term "emission bandwidth" as it is defined in the NPRM.

in its Petition for Rulemaking. The proposed interim sharing rules are optimized for intermittent transmission of information such as files and still images with quick response times; they are not suitable for constant rate information flow such as those envisioned for the future services of asynchronous transfer mode ("ATM"). Further, the Listen-Before-Talk protocols, which require quick access and short holding time such as that of the proposed interim rules, become inefficient at high data rates (> 10 Mbit/second) as they use valuable air time in avoiding or resolving conflicts in spectrum use.

WINForum is committed to developing, as quickly as possible, an industry consensus on sharing rules. Lucent strongly supports this effort. There is every reason to believe that WINForum will succeed at gaining an industry consensus without significant delay. Thus, there does not appear to be a need for interim sharing rules in the lower bands given the commitment of the industry to arrive at a consensus soon. In the event the WINForum process is delayed, the Commission can then evaluate the need for interim spectrum sharing rules.

Respectfully submitted,

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